Liverpool John Moores University

Title:	OPERATIONAL RESEARCH
Status:	Definitive but changes made
Code:	**6001MATHS** (103237)
Version Start Date:	01-08-2018
Owning School/Faculty:	Applied Mathematics
Teaching School/Faculty:	Applied Mathematics

Team	Leader
Vincent Kwasnica	Y

Academic Level:	FHEQ6	**Credit Value:**	24	**Total Delivered Hours:**	75
Total Learning Hours:	240	**Private Study:**	165		

Delivery Options
Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	24
Practical	8
Tutorial	40

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Test	AS1	An in class assessment in which students are required to produce a report on mathematical programming supplemented with considerable mathematical analysis, problem solving and investigation.	15	
Test	AS2	An in class assessment in which students are required to produce a report on simulation supplemented with considerable mathematical analysis, problem solving and investigation.	15	
Exam	AS3	Examination	70	3

Aims

To examine a wide range of operational research methods and their applicability to real-life problems encountered in business and industry.

Learning Outcomes

After completing the module the student should be able to:

1	Formulate and solve problems involving operational research.
2	Apply the methods of mathematical programming to solving practical problems.
3	Apply the method of simulation to modeling a real-life problem, interpret the solution, analyse limitations of the models and provide a non-technical report.
4	Critically evaluate the benefits and limitations of operational research techniques when applied to real-life problem scenarios.
5	Express operational research analyses in the vernacular (for non-experts).
6	Critically evaluate the role that computer software plays in the analysis and solution of operational research problems.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Mathematical programming	2	5	
Simulation supplemented	3	5	6
Examination	1	4	

Outline Syllabus

Linear programming: Definition of a linear programming problem, graphical representation, the Simplex method and revised Simplex method, sensitivity analysis.
Transportation problems: transportation algorithm. Unequal supply and demand. Optimal sourcing problems. Trans-shipment problems. Assignment problems: maximisation of resources.
Integer programming: Relevance of integer variables, Branch & Bound method. Gomory's method of Cutting Planes.
Non-linear programming: Non-linearity of objective and constraint functions, the Reduced-gradient method.
Simulation: Basic principles, examples taken from Investment Appraisal, Queuing Theory and Traffic management.
Queuing Theory: Single server and Multiple server models,.
Inventory models: Deterministic and Stochastic Inventory models.
Critical Path Analysis: the method and its use in the management of problems, PERT, Crashing Networks, Gantt Charts.

Heuristic methods: Scheduling problems, Heuristic Thinking.
Markov chain analysis.
Soft Systems Methodologies: CATWOE Analysis, Viable System Model, Variety and Entropy
Software packages: Review of available software, practice in the use of one such package to solve more realistic real-life problems.

Learning Activities

Lectures reinforced by computer-laboratory sessions.

Notes

Procedures for formulating and solving mathematical programming problems which have business application are presented.